Mitutoyo

MeasurLink® ENABLED
Data Management Software by Mitutoyo

Wireless Measurement Data Communication System
U-WAVE

Small Tool Instruments and Data Management

Promotes the Smart Factory by Collecting and Managing Measurement Data

"U-WAVE", the wireless communication system, collects measurement data in the inspection process swiftly and accurately, to increase a company's competitiveness with detailed data analysis. With MeasurLink, "IIOT* of Quality Control envisioned by Mitutoyo" can be achieved.

*Industrial Internet of Things

Achieve Smart Measurement

Wireless Measurement Data Communication System

U-WAVE

This system transmits data wirelessly from Mitutoyo Digimatic gages to SPC software or any software that accepts keyboard input, such as MeasurLink, Excel, or web browser.
It saves time, eliminates typos, helps achieve cost reductions and better efficiency while maintaining excellent operability.

U-WAVE fit

Compared to U-Wave T*, the compact and thin design provides better operability and fit to digimatic micrometers and calipers**

*please refer to page 8 for more details
**excludes micrometers and calipers over 12", MDH, Quick Mike, and some specialty hand tools

From a Digimatic gage connected with U-WAVE

Data is obtained via wireless communication and sent to commercial software such as Excel or MeasurLink

Advantages of Introducing U-WAVE

Higher Efficiency

Data can be input by single button operation! Since there is no need for manual input, typing errors do not occur. Efficiency is greatly improved!

Centralized Data Management

Measurement data can be managed centrally! "Visualization of quality" helps prevent the production of defective products!

Cost Reduction Effect

Modular design allows easy connection to existing Digimatic gages! Digimatic output comes standard on all specialty Mitutoyo gages such as spline and V-anvil micrometers, blade calipers, and carbon fiber calipers.

U-WAVE resolves measuring process issues!

Issue

Manual input of measurement data is inefficient and frequently generates mistakes in entering data (ie. transposing number, missing decimal, etc.)

Solution

U-WAVE immediately transmits the measurement data to your PC. Errors due to manual input can be eliminated, and therefore data reliability and operational efficiency is improved.

Issue

Wireless data transmission is unreliable in a noisy, industrial environment.

Solution

U-Wave boasts industry leading signal transmission and has been tested in poor conditions, proven to maintain strong signal connection.

Issue

Since multiple operators use Digimatic gages, it takes a long time for data collection and Pass/fail judgment.

Solution

Up to 100 Digimatic gages can be registered to a single U-WAVE receiver on the PC side. The data can automatically be entered separately in the Excel sheet. Therefore, data collection and Pass/fail judgment are easily performed.

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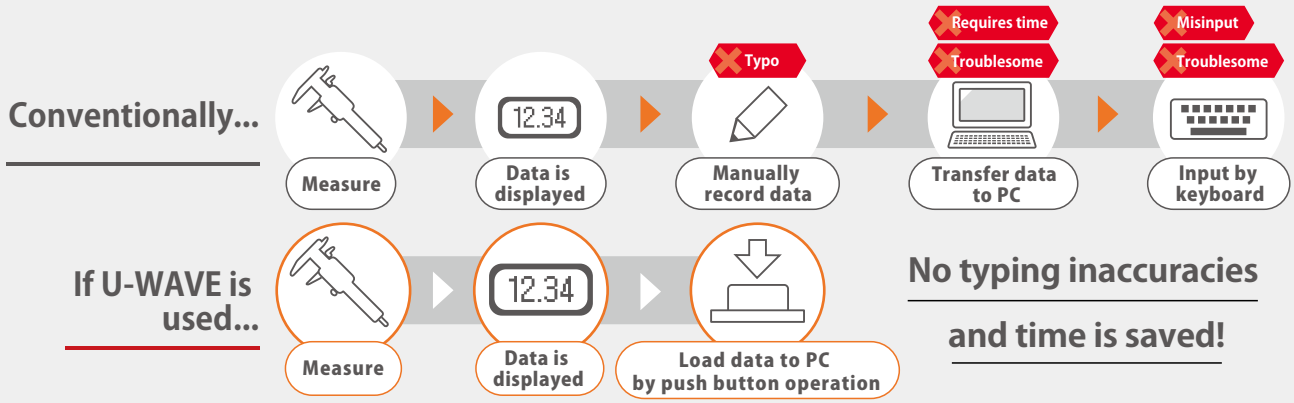
Speedy and Reliable Data Collection Judgment Improves Manufacturing Competitiveness

Higher Efficiency



LED or a buzzer* notifies data reception

Patented in Japan

Confirmation that data was successfully received.

* The optional buzzer model includes LED.

- Normally received: green LED blinks
- Buzzer sounds twice briefly

- Reception failed: red LED blinks
- Buzzer sounds once

Dustproof and water resistant IP67 model

The buzzerless transmitter can be submerged in water and is completely resistant to dust, maintaining the highest IP rating of the gage.

IP67

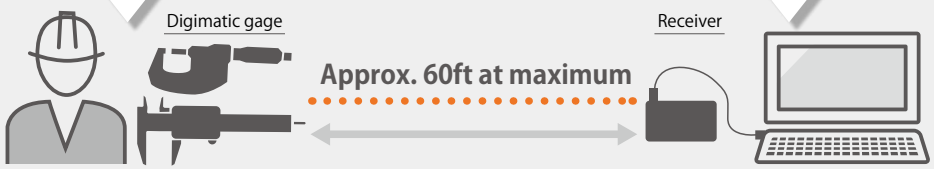
Cordless enables freedom of movement

No cord allows easy operation especially with large measuring tools, workpieces, and distant computers.

Wireless communication range up to 60ft*1 (line of sight)

The measurement site can be laid out freely.

*1: May be less according to the operating environment.



Typing errors generated by manual input is eliminated

The measurement data can be transmitted directly by a single button operation.

Industrial wireless communication

Mitutoyo's original wireless communication based on IEEE802.15.4 (2.4 GHz) has been adopted.

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Advantage

Centralized Data Management

Operation in an Excel sheet

The data can be read directly from an Excel sheet.

Digitalization enables easy data collection and analysis

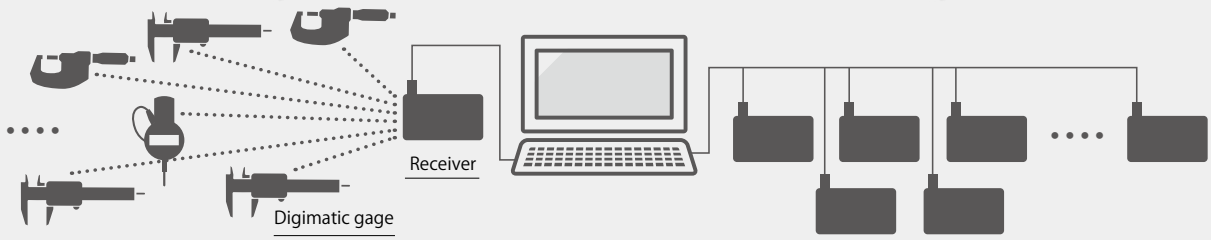
The measurement data from each process can be stored and managed on a central database with MeasurLink.

Up to 100 Digimatic gages can be registered to a single U-Wave Receiver

Using MeasurLink or USB-ITPAK V2.1, data can be laid out for each Digimatic gage based on the data identification ID.

Up to 15 receivers can be connected to a PC or multiple PCs

Data can be collected up to 1,500 measuring instruments equipped with Digimatic output on a central database.

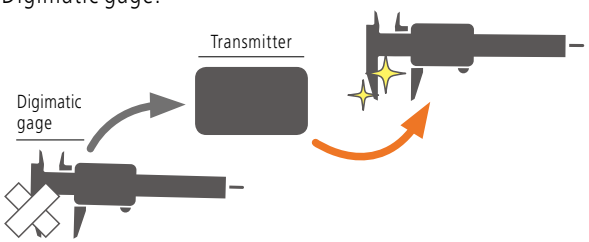


Cost Reduction Effect

Point

If a Digimatic gage is damaged, operation can be continued using a different gage

The transmitter can be reconnected to a different Digimatic gage.



Point

Connectable to any of your existing Digimatic SPC gages

No need to buy a replacement if your tool is equipped with the Digimatic function.

Point

Approximately 400,000 continuous data transmissions are possible

Just one CR2032 lithium battery provides power for about 400,000 data transmissions.

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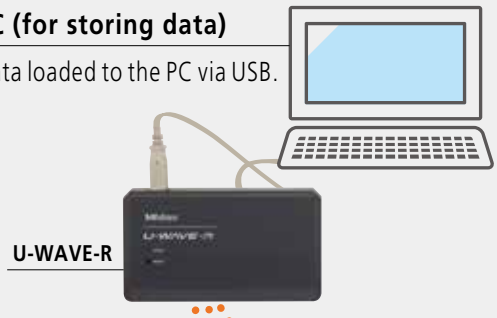
Product Configuration

(Refer to pages 7 and 8 for details.)

Receiver

U-WAVE-R

- Receives measurement data and transmits to the PC via USB.
- Since USB bus power system is used, a battery or adapter is not required.
- The ID and frequency can be set using supplied software U-WAVEPAK.
- The data load function to Excel, etc. is supplied as a standard accessory.



Transmitters

NEW Products

U-WAVE-TM/TC/T

- Transmits the measurement data displayed on the gage to U-WAVE-R.
- Compact, cable-less design provides a better fit with the Digimatic gage and better operability.

U-WAVE fit

Connecting unit/connecting cable

- A compact connecting unit connects the U-WAVE-TM/TC transmitter to the Digimatic gage.
- A dedicated cable connects the U-WAVE-T transmitter to the Digimatic gage.

Digimatic gages

Compatibility

- U-WAVE-TM/TC can be used with most of the calipers and micrometers equipped with the Digimatic output function.
- U-WAVE-T can be used with all the Digimatic gages equipped with the Digimatic output function.

Product Outline

U-WAVE-TM/TC compatible Digimatic gages (reference)

For details, refer to a separate sheet "U-WAVE-TM/TC Compatible Devices" or our web site.

Digimatic micrometer

Digimatic caliper

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Transmitters

NEW Products

U-WAVE-TM/TC

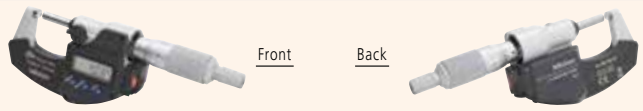
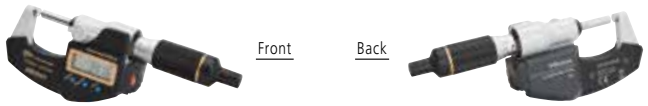
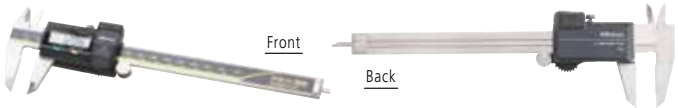
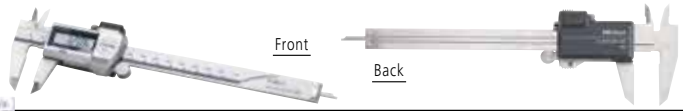
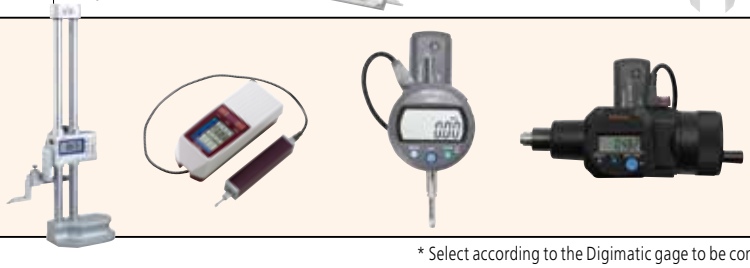
Patent applied for in Japan, U.S., China, and Germany
Design registered in Japan, U.S., EU, and China

With functions and performance inherited from U-WAVE-T, a compact and thinner design provides a neater solution which eliminated cables around the Digimatic gage and fot better operability!

U-WAVE fit

U-WAVE-TM for micrometers and U-WAVE-TC for calipers are available, both as the buzzer type and water/dust-proof IP67 type. The buzzer type notifies the normal reception of data by LED and buzzer sound. The water/dust-proof IP67 type is designed for a harsh environment and as such is only equipped with LED notification of data reception.

Connecting compatible micrometers, calipers and other Digimatic gages to U-WAVE

Gage		Assembled appearance	Connecting unit/connecting cable
For micrometers	Standard	 Front Back	 02AZF310
	Water/ dust-proof	 Front Back	
For calipers	Standard	 Front Back	 02AZF300
	Water/ dust-proof	 Front Back	 02AZF310
Digimatic gages			Connecting cable* 

* Select according to the Digimatic gage to be connected. Refer to page 13 for connecting cables.

Type of Transmission Unit

U-WAVE-T

Design registered in Japan

This product successfully introduced U-WAVE to the industry.

U-WAVE-T is connected to a Digimatic gage with a dedicated cable that mates with the data connector on that particular gage.

The buzzer type and water/dust-proof IP67 type are available. The buzzer type notifies the normal reception of data by LED and buzzer sound. The water/dust-proof IP67 type is designed for a harsh environment and as such is only equipped with LED notification of data reception.

Transmitter		Receiver
U-WAVE-TM With buzzer 264-623	 U-WAVE fit	 U-WAVE-R 02AZD810D Design registered in Japan
IP67 U-WAVE-TM Water/dust-proof 264-622	 U-WAVE fit	
U-WAVE-TC With buzzer 264-621	 U-WAVE fit	
IP67 U-WAVE-TC Water/dust-proof 264-620	 U-WAVE fit	
U-WAVE-T With buzzer 02AZD880G		
IP67 U-WAVE-T Water/dust-proof 02AZD730G		

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Typical Measuring Issues Solved

In combination with application software MeasurLink or USB-ITPAK V2.1, better efficiency in quality assurance can be achieved.

Case 1 Standard sequential measurement input

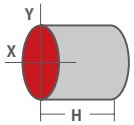
Issue

To record the measurement results, on a chart, from three points on a mass-produced product measured using two gages.

Solution

Set the procedure of inputting data to the Excel sheet with USB-ITPAK V2.1, to automatically enter measurement data.

Measure the workpiece dimensions, X and Y, with a micrometer. Then, measure H with a caliper. Finally, visually check the appearance and judge OK or NG. Perform the above for 5 workpieces consecutively.



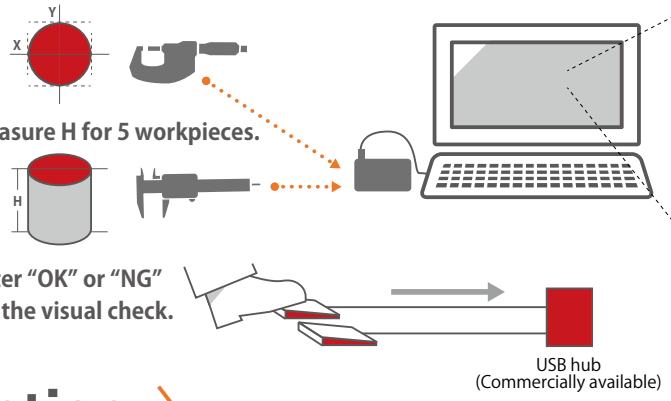
Point **Measurements in order**

The designated table will be created by measuring and transmitting data for X and Y of 5 workpieces, measuring and transmitting data of H, and then entering the result of visual check.

Point **Set the sequential measurement input order**

Designate the Excel sheet, select the data loading range, loading order, and allocate the ID for each cell.

1. Measure X and Y for 5 workpieces with a micrometer.
2. Measure H for 5 workpieces.
3. Enter "OK" or "NG" for the visual check.



Designated Excel sheet

	A	B	C	D	E	F	
1	Setting	1	2	3	4	5	
2	Dimension X	10.025	10.033	9.964	10.031	10.046	Input range of micrometer
3	Dimension Y	9.982	10.017	10.008	9.996	10.027	
4	Dimension H	29.97	30.02	30.07	29.96	30.04	Input range of caliper
5	External Appearance	OK	OK	NG			Input range of visual judgment

Data will be input one by one in the registered order to the cells of the Excel sheet designated beforehand.

Option

USB-ITPAK V2.1

A USB dongle must be connected to the PC running the software.

USB dongle

Measurement Data Collection Software

USB-ITPAK V2.1

USB-ITPAK V2.1 is optional software to be installed in the PC connected with U-WAVE-R. It enables setting up the procedure to input the measurement data received from U-WAVE-R to the Excel sheet and to achieve greater inspection efficiency and enhanced credibility.

The combined use with U-WAVE will improve the operational efficiency of the inspection work.

Best suited for recording data in mass-production inspections where the procedure is repeated every day.

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Case Study

Case 2

Data input by multiple operators

Issue To sort data into separate Excel sheets per Digimatic gage in the inspection process.

Solution The data collected by multiple operators can be individually set to be input to the designated cells in the Excel sheet.

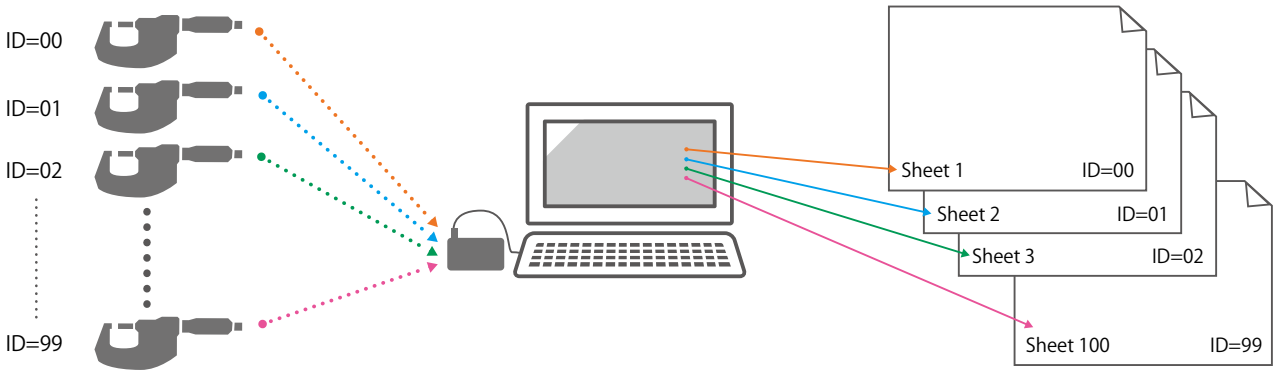
Input data of each Digimatic gage in order into the designated cells of the separate Excel sheet.

Point **Up to 100 Digimatic gages can be registered**

100 Digimatic gages at maximum can be registered to a receiver and the same number of Excel sheets can be designated.

Point **Designate the Excel sheet per Digimatic gage**

Using USB-ITPAK, designate the Excel sheet per Digimatic gage. Then, same as the sequential measurement, select the data loading range, loading order, and allocate the IDs.



Multiple measurement data (via U-WAVE-TM/TC/T) can be sorted into the separate Excel sheets without requiring you to program macros.

Features of USB-ITPAK V2.1

- The measuring methods can be configured, such as sequential measurement, batch measurement, individual measurement and more.
- Data can be canceled by a single operation of the foot switch or function key.
- Input range can be specified per Digimatic gage, which reduces the chance of a misinput.
- Data input or cancellation can be instructed globally in multiple-point simultaneous measurement.
- The Excel sheet can be automatically called for data input.
- The cursor movement after data input can be set to enable automatic input.

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Case Study

Case 3

Batch measurement using timer

Issue To measure displacement using multiple Digimatic gages and automatically obtain data in a certain input interval.

Solution Batch timer input is available using the USB-ITPAK batch measurement function and the optional timer input function.

Specify the interval for measuring the displacement of the workpiece and collect data at once.

Point **Batch measurement with all the Digimatic gages**

Data can be obtained globally by a foot switch operation.

Point **Timer input option**

Using USB-ITPAK, the data request interval can be set by hours, minutes, and seconds (0.0 sec. to 24 hrs.).

Point **Batch timer input**

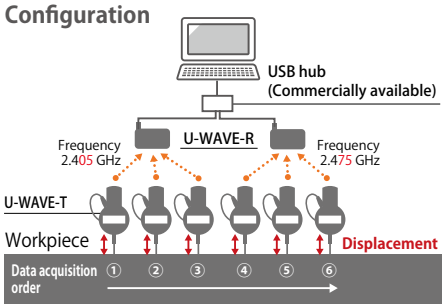
Data can be obtained at the desired interval using the timer input function in batch measurement.

	A	B	C	D	E	F	G
1	Displacement (1)	Displacement (2)	Displacement (3)	Displacement (4)	Displacement (5)	Displacement (6)	Measurement date/ time
2	0.281	0.162	0.121	0.051	0.011	−0.001	2013/4/1 7 30 00
3	0.279	0.152	0.133	0.064	0.018	−0.003	2013/4/1 7 30 05
4	0.265	0.149	0.142	0.089	0.021	−0.007	2013/4/1 7 30 10
5							
6							

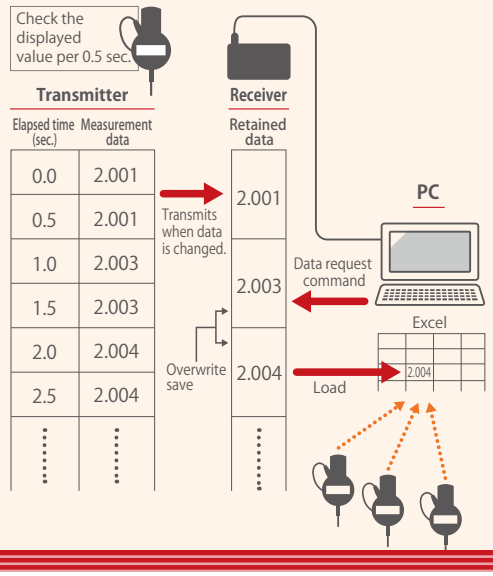
After 5 sec.
After 5 sec.
After 5 sec.

- To perform simultaneous measurement using U-WAVE, a special order software U-WAVEPAK (Event drive) is required.
- Since the data refresh interval of the event drive is fixed at 0.5 seconds, the setting range is from 0.5 seconds to 24 hours.

Configuration



Option



Responds to data request from PC

Special order U-WAVEPAK (Event drive)

Using event drive mode

① For configuration, special order software U-WAVEPAK (Event drive) is used.
② The data request command can be sent to U-WAVE-R at an arbitrary timing.

Responds to data request command

① U-WAVE-TM/TC/T checks the displayed value of the Digimatic gage in the 0.5 sec. interval, and transfers data if the value is changed.
② U-WAVE-R overwrites data in the storage.
③ Sends data responding to the data request command.

Enables automatic data load

Without operating the send button of the Digimatic gage, data can be obtained automatically from multiple Digimatic gages.

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Achieve “Visualization of Quality”

Collecting the measurement data

Measurement Data Wireless Communication System

U-WAVE

IIoT of Quality Control

Measurement Data Network System

MeasurLink

Configure the measurement system with MeasurLink using U-WAVE as the base for Smart Measurement

The benefits of MeasurLink®

MeasurLink is an IIoT platform for quality management that realizes “Visualization of Quality” by enabling real-time data collection with easy to see charts and statistics. From the networked Digimatic gages to global control and analysis, U-Wave supports MeasurLink as an infrastructure that collects and controls data.

Preventing defectives

Collects data from the Digimatic gages on the network and performs statistical process control (SPC) to warn of possible generation of defectives.

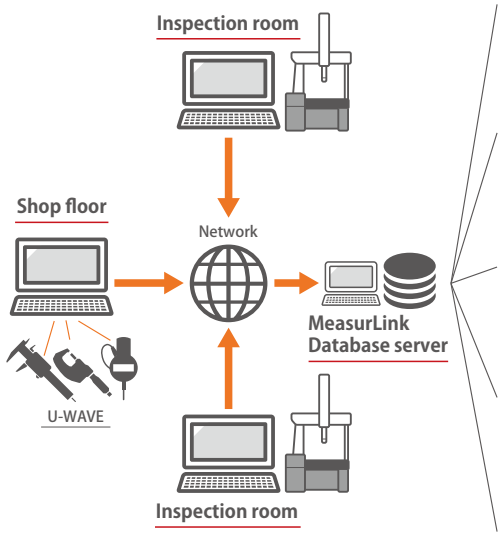
Diagnosis by data analysis

Check measurement results by accessing the data base and perform various analyses to help investigate and resolve process performance concerns.

Begin achieving IIoT

In addition to conventional data storage, the network can be configured in steps to begin IIoT of Quality Control.

Linkage between U-WAVE and MeasurLink



Data Collection Software MeasurLink Real-Time

This SPC software allows data collection from each tool and instrument and still allows realtime display of statistical processing data such as control charts, histograms and process capability indexes.

Process Management for Administrators MeasurLink Process Manager

This administrative software enables centralized monitoring of information from all MeasurLink data collection terminals networked together on the shop floor.

Process Analysis module for Administrators MeasurLink Process Analyzer

This administrative software allows confirmation of measurement results and various statistical analyses by access to the database where the measurement data collected with MeasurLink Real-Time is stored.

Gage Management Software MeasurLink Gage Management

This software plans and implements a complete calibration schedule and incorporates a powerful retrieval function in addition to recording and managing the operational status of gages.

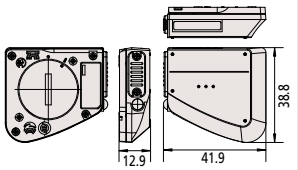
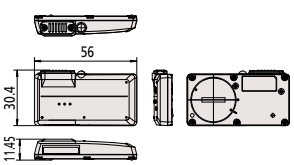
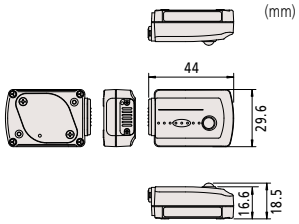
Evaluation / Analysis Software for Measurement System Analysis (MSA) MeasurLink Gage R&R

This is evaluation and analysis software compliant with the MSA* required in ISO/ TS 16949. *Measurement System Analysis

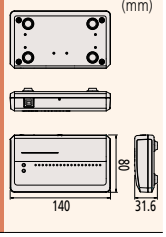
Measurement data ▶ Collect data ▶ Unify ▶ Analyze ▶ Visualize

Specifications

Transmitter (Refer to page 7 for combinations.)

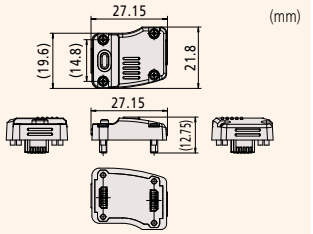
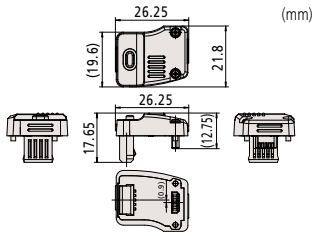
Product name	U-WAVE-TM (for micrometers)		U-WAVE-TC (for calipers)		U-WAVE-T	
Model	U-WAVE-TM (IP67 type dust/water-proof)	U-WAVE-TM (buzzer type)	U-WAVE-TC (IP67 type dust/water-proof)	U-WAVE-TC (buzzer type)	U-WAVE-T (IP67 type dust/water-proof)	U-WAVE-T (buzzer type)
Order No.	264-622	264-623	264-620	264-621	02AZD730G	02AZD880G
Protection level	IP67	N/A	IP67	N/A	IP67	N/A
Data reception indication	LED	LED, buzzer	LED	LED, buzzer	LED	LED, buzzer
Power supply	Lithium battery CR2032×1					
Battery life	Approximately 400,000 transmissions					
Mass	18g				23g	
Appearance						
External dimensions						

Receiver

U-WAVE-R	
Model	U-WAVE-R
Order No.	02AZD810D
Power supply	USB bus power system
Connectable U-WAVE-R units (per PC)	Up to 15
Connectable U-WAVE-T units	Up to 100
Mass	130g
Appearance	
External dimensions	

U-WavePak comes standard with each Uwave-R to manage hardware and incoming data. Compatible OS: Windows 2000 Professional (SP2 or later) / Windows XP / Home Edition (SP2 or later) / Windows XP Professional (SP2 or later) / Windows Vista* / Windows 7* / Windows 8* / Windows 8.1* /Windows 10* (*compatible with 32/64-bit OS)

Connecting unit/connecting cable (Refer to page 7 for combinations.)

Product name	Order No.	Protection level	Mass	Appearance	External dimensions
Connecting unit (for water/dust-proof type)	02AZF310	IP67	6g		
Connecting unit (for standard type)	02AZF300	N/A	6g		

Product name	Appearance		Cable connector type	Part No.
Dedicated cable for U-WAVE-T		A	Water-proof type with output button	02AZD790A
		B	Water-proof type with output button	02AZD790B
		C	With data-out button	02AZD790C
		D	Flat 10-pin type	02AZD790D
		E	Round 6-pin type	02AZD790E
		F	Flat straight type	02AZD790F
		G	Flat straight waterproof type	02AZD790G

Wireless Communication Specifications

Wireless communication	Original (based on IEEE802.15.4 (2.4 GHz))	Modulation method	DS-SS (Direct Sequence - Spread Spectrum) Resistant to interfering signals and noise
Wireless communication distance	Approx. 20 m (line of sight)	Communication frequency	2.4 GHz band (ISM band: Universal frequency)
Wireless communication speed	250kbps	Used band	15 channels (2.405 to 2.475 GHz at intervals of 5 MHz) The noise search function avoids interference with other communication devices.
Transmission output	U-WAVE-T: 1 mW (0 dBm) or less U-WAVE-TC/TM: 2.5 mW (4 dBm) or less		

Note: This product is a radio equipment classified in the 2.4 GHz Wide-band Low Power Data Communication System.
To use this product, conformity to the radio law of each country is required. Please contact your dealer or nearest Mitutoyo sales office.

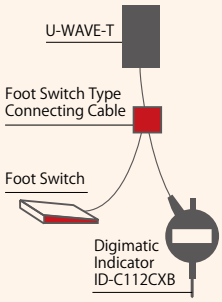
Optional Products

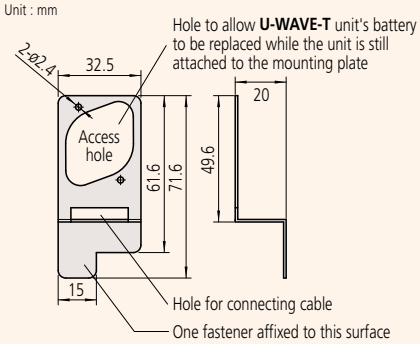
Application system

Product name	Model No.	Compatible OS: Windows*1	Compatible Excel version*2	Part No.
USB-ITPAK	USB-ITPAK V2.1	2000 SP4 XP SP2 or later Vista 7 8 8.1 10	2000 2002 2003 2007 2010 2013 2016	06AFM386
U-WAVEPAK (for event drive)	This is a special order product. For the latest pricing, please contact your dealer or the nearest Mitutoyo Service Center. Product configuration: Only the program CD ● For U-WAVE-R and U-WAVE-TM/TC/T, please purchase the standard model. ● Install this special order U-WAVEPAK (Event drive) and perform setups without using the standard accessory U-WAVEPAK. ● A program to send a data request command is separately required to load data to the PC. <Event drive supporting software> USB-ITPAK V2.1 (manual input by the function key or foot switch and automatic timer input enabled)			

*1: 32-bit, 64-bit OS supported *2: The operation with Excel for MAC OS is not guaranteed.

Accessories for U-WAVE-T

Product name	Product configuration				Order No.
Foot switch and connecting cable		Foot switch			937179T
		Connector type	A	Water-proof with switch	02AZE140A
			B	Water-proof with switch	02AZE140B
			C	With switch	02AZE140C
			D	10-pin plain	02AZE140D
			E	6-pin round	02AZE140E
			F	Straight type	02AZE140F
			G	Water-proof straight type	02AZE140G

Product name	Appearance	Dimensions and fixing example	Order No.
U-WAVE-T Installation Bracket Kit		Unit : mm  Digimatic Indicator ID-C112XB 	02AZE200

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

Optical Measuring

Sensor Systems

Test Equipment and Seismometers

Digital Scale and DRO Systems

Small Tool Instruments and Date Management

Whatever your challenges are,
Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top-quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

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